

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

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STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS
PROJECT NO.: F-78-R-3 STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER AND WARMWATER ECOSYSTEMS
JOB NO.: V-e JOB TITLE: NORTHEAST MONTANA WARMWATER ECOSYSTEM INVESTIGATIONS
JOB PERIOD: JULY 1, 1996 THROUGH JUNE 30, 1997

ABSTRACT

Paddlefish harvest and tagging records were maintained for populations in the dredge cuts and Missouri River above Fort Peck Reservoir. Harvest on both populations remains low. A paddlefish creel census was conducted on the fishery above Fort Peck Reservoir during the spring of 1996. Total fishing pressure was estimated at 3,655 angler days with a total harvest of 514 paddlefish. Fishermen released 50% of the paddlefish landed. Non-resident anglers from 13 states accounted for 10% of the fishing pressure. Gill netting in Fresno Reservoir produced good catches of lake whitefish, northern pike and walleye. Using recaptured marked fish, an estimate was made of the 1990 walleye year-class. Planted walleye contributed less than 6% to the year-class. Beach seining indicated good reproductive success for all species. A creel census conducted from May-September showed a doubling of fishing pressure since 1990 and excellent harvests of walleye and northern pike. Population estimates were made for walleye and pike and harvest rates were calculated. Harvest of Age III walleye appears to be excessive. Beach seining at Nelson Reservoir indicated reproductive success of northern pike, perch and walleye was good. Experimental gill-net stations were sampled in 1996 and indicated walleye numbers may be at an all-time high. Walleye sampled in Beaver Creek Reservoir provided sufficient recaptures to estimate three year-classes of walleye. Natural reproduction of walleye was unconfirmed, but a relatively large number of young-of-the-year (YOY) walleye were captured indicating some natural reproduction may be supplementing the population. Supplemental stocking of northern pike to Bailey Reservoir from Fresno Reservoir was successful. Fishing pressure on large (>10 lbs.) northern pike may be excessive during the ice fishing/spearfishing season. Walleye continue to do well in Little Warm Reservoir. Tiger muskie introductions have been successful.

OBJECTIVES AND DEGREE OF ATTAINMENT

- 1) Survey and Inventory - To survey and monitor the characteristics and trends of fish populations, angler harvest and preferences, and to assess habitat conditions in selected waters. Objective accomplished, data presented.
- 2) Fish Population Management - To implement fish stocking and/or fish eradication actions to maintain fish populations at levels consistent with habitat conditions and other limiting factors. Objective accomplished, data presented.

PLEASE RETURN



Engineers funded study, and projects overseen by Bill Gardner and Phil Stewart under Dingell-Johnson Project FW-2-R.

Two tagged paddlefish were harvested by fishermen during 1996. One fish was taken in North Dakota, the other at Intake on the Yellowstone River. To date, 172 paddlefish tagged in the study area have been harvested; 73 (43%) in the Dredge Cuts and 99 (57%) in the Yellowstone or Missouri River, primarily at Intake Dam. During the past ten years (1986-96), however, over 80% of the tag returns have been from the Yellowstone River. This is due in part to the higher fishing pressure and harvest at Intake Dam and at the relatively new fishery near the confluence in North Dakota. It also suggests a high rate of paddlefish mobility and interchange between the Missouri and Yellowstone Rivers.

The harvest rate for paddlefish in this area remains low as summarized in Table 1. The average annual percent harvest for 817 fish tagged during 1974-84 varied from 0.4-1.5%. The average annual harvest rate prior to 1974 was 1.0% (Needham, 1985). Paddlefish tagged in the Missouri River outside the Dredge Cuts experienced the same low exploitation rates as those tagged in the Dredge Cuts.

Table 1. A summary of paddlefish tagging and harvest from the dredge cut complex and Missouri River, 1968-96. Percent harvest was derived by adjusting for harvest of tagged fish. All fish were tagged in the dredge cuts except 40 fish in 1979 and all fish in 1980-82 which were tagged in the Missouri River.

Year	No. Tagged	No. Tag Returns 1996	Total No. Tags Returned	Percent Tags Returned	Avg. Annual % Harvest
1968	12	0	1	8.3	*
1969 ¹	94 (92)	1	16	17.4	*
1970	5	0	0	0.0	*
1974 ²	189 (185)	0	35	18.9	0.9
1976 ³	48 (47)	0	10	21.2	1.1
1977	40	0	10	25.0	1.3
1978 ⁴	162 (156)	0	40 ⁵	25.6	1.4
1979	151	0	32	21.2	1.2
1979	40 (River)	1	4	10.0	0.6
1980	29 (River)	0	2	6.9	0.4
1981	60 (River)	0	8	13.3	0.8
1982	21 (River)	0	4	19.0	1.3
1984	77	0	10	13.0	1.0
	928	2	172		

*Calculation discontinued.

¹Harvest based on 93 fish in 1978 and 92 in 1984 for dead fish or tag removal.

²Harvest based on 188 fish in 1979; 187 in 1983; 186 in 1984; and 185 beginning in 1987 for dead fish or tag removal.

³Harvest based on 47 fish beginning in 1978 for one fish found dead.

⁴Harvest based on 161 fish in 1979; 160 in 1980; 158 in 1982; 157 in 1986; and 156 beginning in 1988 due to dead fish.

⁵Total includes one fish possibly tagged in 1977.

The largest groups of paddlefish tagged in a single season are 189 in 1974, 162 in 1978, and 151 in 1979. After 22, 18, 17 years of fishing pressure and harvest exposure, these groups have exhibited an average annual harvest rate of 0.09-1.4%, and the total harvest rate ranged from 18.9-25.6%.

The Fort Peck Indian Reservation began selling paddlefish tags in 1992. This was initiated in response to increasing interest in paddlefish snagging, particularly in the Frazer pumpsite area downstream from Fort Peck Dam. No data relative to tag sales or harvest has been received as yet from the tribe; however, harvest is not thought to be significant at this time.

Fort Peck Reservoir and Missouri River Upstream

Tagging and harvest records for previously tagged fish were maintained. During the period 1973-92, a total of 527 paddlefish were tagged in this study area. This total includes 192 fish tagged in the upper portion of Fort Peck Reservoir in 1978 and 29 fish tagged in the reservoir in 1992.

In 1993 a project was initiated to tag a relatively large number of paddlefish over five consecutive years. A total of 434 paddlefish were tagged in 1993. The majority (314) were tagged in the Missouri River during the annual spawning run. An additional 120 fish were netted and tagged in the headwaters of Fort Peck Reservoir prior to trigger flows occurring in the river. An additional 499 fish were tagged in the river in 1994, 456 in 1995, and 281 were tagged in 1996.

Berg (1981) noted that significant upstream movement of paddlefish did not occur until flows reached 14,000 cubic feet per second (cfs) at the Virgelle gauging station. The 14,000 cfs flow is considered to be a "trigger" flow for spawning fish. Initial trigger flows in 1996 occurred in mid-March. Flows continued very high through June which made sampling difficult. Drift netting in the lower river area commenced on April 23. Equipment breakdowns occurred in late May and sampling was discontinued. No ripe female paddlefish were captured during the tagging period.

Forty-one tagged paddlefish were harvested in 1996. Thirteen of those returns were from fish tagged in 1996. Five fish tagged in 1995 were recovered in 1996. All 5 recoveries were males, indicating some males make annual spawning runs or occasionally make dry runs. No females from the previous years' run were captured in 1996. However, 7 of 15 tagged during the 1994 run and recaptured in 1996 were females. Tag return data reveals a low rate of harvest for this paddlefish population as summarized in Table 2. The average annual rate of harvest varies from 0.8-4.6%.

Table 2. A summary of paddlefish tagging and harvest data from the Missouri River and Fort Peck Reservoir, 1976-96. Percent harvest was derived by adjusting for previous harvest of tagged fish.

Year	No. Tagged	No. Tags Returned in 1996	Total No. Tags Returned	% Harvest	Avg. Annual % Harvest
1976	23	0	6	26.1	1.2
1977 ¹	60	0	10	16.7	0.8
1978	227 ²	1	44	19.4	1.0
1979	11	0	5	45.5	2.5
1980	33	1	14	42.4	2.5
1983	2	0	1	50.0	3.6
1986	13	0	4	30.8	2.8
1992	29	1	4	13.8	2.8
1993	434 ³	6	19	4.4	1.1
1994	499	15	34	6.8	2.3
1995	456	5	29	6.4	3.2
1996	281	13	13	4.6	4.6
	1,916	60	209		

¹Total adjusted for one fish killed by commercial fisherman August, 1981.

²192 tagged in Fort Peck Reservoir from UL Bend to Beauchamp Bay.

³120 tagged in Fort Peck Reservoir near Mickus Coulee

The harvest of paddlefish from the Fort Peck Reservoir stock was determined by on-site creel census in 1996.

On-site creel census

The creel census area consisted of approximately 20 miles of river downstream from Fred Robinson Bridge (FRB), upstream from Fort Peck Reservoir. The last complete census was conducted in 1995. Harvest occurs by snagging in the spring as paddlefish migrate upstream from the reservoir. Some fish apparently reside in the river over winter as indicated by the high catch rates experienced in the few days following ice-out in most years. For example, on March 26 of 1993, between 50 and 100 paddlefish were caught, and most released, in an area known as the Big Swirl Hole. A large ice jam was present above the hole and the ice-free area below was accessible to boat snaggers. The ice did not go out upstream at FRB until the following day. Fish were apparently very concentrated as snaggers reported hooking fish on almost every cast, some snagging vertically below their boats. Both males and large females were taken. On March 27 the ice jam blew out and snaggers reported no further success at that location.

Occasionally, paddlefish are also caught in late summer and fall, but due to the low number taken at these seasons, only spring harvest has been monitored. Almost all fish are taken within the boundaries of the Charles M. Russell Wildlife Refuge (CMR).

A system of sampling the entire day was utilized and no records on the length of trip (hours) were maintained. The absolute number of fishermen

and fish taken could be determined on most days. Previous attempts to gather information on hours fished provided unreliable results. Due to the length of fishing trip and erratic fishing activity, information provided by fishermen was not judged to be accurate. It was found that most fishermen greatly over-exaggerated the actual time spent fishing. Estimates of fishermen and fish taken for non-creel days (usually weekdays with light fishing pressure) were made on the basis of known pressure preceding and following non-creel census days and from interviews with snaggers or refuge personnel present throughout the non-census days.

The creel census commenced April 1, 1996, which was 12 days after ice-out on the river. Based on warden and CMR personnel observations and interviews, 14 angler-days of pressure was estimated to have occurred during the interim between ice-out and the start of the creel census. No paddlefish were estimated to have been harvested during this period. These estimates are reflected in the tables. The creel census extended through June 6, at which time fishing effort and success was negligible. An interview card system, which provided completed trip data on anglers leaving the area when the creel clerk was "off duty", assisted in gathering completed trip information.

Total fishing pressure was 3,655 angler-days in 1996 (Figure A). Snagging pressure was similar to that encountered in 1995. Spring weather conditions and river flows often dictate the amount of use this area receives. The total paddlefish harvest in 1996 was estimated to be 514 fish (Table 3). Snagger interviews indicated fish were released at a rate of 40-50%. Historical data indicates snaggers are more inclined to release fish as catch rates increase.

Pressure and Harvest Paddlefish

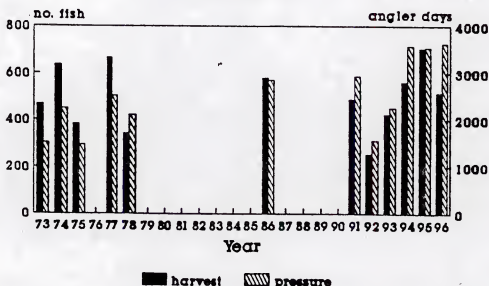


Figure A. Snagging pressure and total harvest as determined by creel census on the Missouri River above Fort Peck Reservoir, 1973-96.

Table 3. A summary of fishing pressure, paddlefish harvest, and catch rates during the spring, 1973-96.

Year	Total Fishermen Man-days			Paddlefish Harvested			Harvest/Fisherman/Day		
	Bank	Boat	Total	Bank	Boat	Total	Bank	Boat	Overall
1973	984 (64.9%)	532 (35.1%)	1,516	290 (62.1%)	177 (37.9%)	467	0.29	0.33	0.31
1974	1,422 (63.1%)	831 (36.9%)	2,253	396 (62.2%)	241 (37.8%)	637	0.28	0.29	0.28
1975	916 (61.8%)	566 (38.2%)	1,482	180 (46.7%)	205 (53.3%)	385	0.20	0.36	0.26
1977	1,429 (56.5%)	1,096 (43.4%)	2,526	322 (48.3%)	344 (51.7%)	666	0.23	0.31	0.26
1978	699 (33.1%)	1,413 (66.9%)	2,112	135 (39.6%)	207 (60.4%)	342	0.19	0.15	0.16
1986	1,664 (58.2%)	1,194 (41.8%)	2,858	315 (54.4%)	264 (45.6%)	579	0.19	0.22	0.20
1991	1,645 (56.0%)	1,293 (44.0%)	2,938	260 (53.3%)	228 (46.7%)	488	0.16	0.18	0.17
1992	796 (50.0%)	796 (50.0%)	1,592	102 (40.3%)	152 (59.7%)	254	0.13	0.19	0.16
1993	1,254 (55.7%)	999 (44.3%)	2,253	232 (54.9%)	190 (45.1%)	422	0.19	0.19	0.19
1994	1,780 (49.0%)	1,806 (51.0%)	3,586	313 (56.0%)	248 (44.0%)	561	0.18	0.14	0.16
1995	1,827 (50.1%)	1,820 (49.9%)	3,647	317 (44.5%)	395 (55.5%)	712	0.18	0.22	0.20
1996	1,899 (52.0%)	1,756 (48.0%)	3,655	232 (45.1%)	282 (64.9%)	514	0.12	0.16	0.14

Length and weight data was obtained from 439 paddlefish harvested: 161 males and 278 females (Table 4). Total-length measurements are no longer used due to an unacceptable level of accuracy and morphological variation due primarily to tail and paddle erosion or damage. Body-length or eye-fork length is the accepted standard measurement currently used. Body length is defined as the distance between the anterior portion of the eye and the caudal fin fork. Paddlefish were selected at random and by availability for measuring. Paddlefish examined during the creel census period produced a sex ratio of 39% males and 61% females. Fish captured by gill nets (n=311) in 1996 produced a sex ratio of 66% males and 34% females. If the random gill netting was a true indicator of the sex ratio present in the run, then a significant amount of hygrading is probably occurring.

Harvested male paddlefish averaged 31.0 pounds in 1996. The average weight of harvested female paddlefish was 68.0 pounds. Eight (3.0%) of 278 females observed and harvested in 1996 weighed over 100 pounds.

Table 4. A summary of paddlefish size data from harvested fish on the Missouri River above Fort Peck Reservoir, 1965-96.

Year	Females		Males	
	No.	Avg. Weight	No.	Avg. Weight
1965	13	81.5	21	36.4
1966	36	74.4	30	32.1
1970	7	77.0	2	44.0
1971	10	85.7	1	44.0
1973	46	76.1	50	35.0
1974	58	74.5	67	32.8
1975	63	74.8	56	34.6
1977	96	78.3	135	39.4
1978	58	87.9	76	38.2
1986	101	76.3	167	33.5
1991	168	59.7	192	32.2
1992	124	70.7	86	34.6
1993	137	73.1	199	32.6
1994	241	69.2	140	28.1
1995	204	66.0	348	31.0
1996	278	68.0	161	31.0

Paddlefish dentaries were collected from harvested fish to assist in determining the age structure of the Fort Peck Reservoir stock. Jaw sections were collected and sent to the University of Idaho for sectioning and aging. Results of the aging will be presented in a later report. However, preliminary age data suggests good recruitment and a rather normal age distribution at this time.

Non-residents accounted for 382 angler-days or 10% of the total fishing pressure and is summarized below:

Nonresident Fishermen (angler-days)

1. Wyoming	188	8. Washington	8
2. Oregon	46	9. N. Dakota	7
3. Idaho	34	10. Colorado	10
4. Florida	27	11. Wisconsin	6
5. Minnesota	23	12. Iowa	5
6. S. Dakota	16	13. New York	1
7. Arkansas	15		

Mail harvest survey

The requirement that all snaggers purchase tags before fishing has allowed the department since 1993 to mail surveys to all who purchased tags. However, no mail survey was conducted in 1996. For reporting purposes the Missouri River was divided into three areas. Area 1 was described as the Missouri River upstream from FRB. Area 2 included Fort Peck Reservoir upstream to FRB. This area corresponds closely with the study area for the on-site creel census. The reach from Fort Peck Dam to the Montana Border was designated Area 3. In 1993, a survey return rate of 88% was achieved by following up on non-returnees by telephone. No such follow-up was attempted in 1994 or 1995 and the return rate fell to 58% and 60% respectively. Results of the mail survey and on-site creel census were compared for Area 2 (Table 5). In all years, pressure and harvest was reported significantly higher from the mail survey. The number of reported harvested fish was 20% higher from the mail survey than the on-site census in 1993 and 1994. In 1995 the mail survey indicated a 12% higher harvest than on-site. The higher numbers can be explained by the fact that the mail survey encompassed five additional months than the on-site creel census and a creel clerk is not on duty every day in the spring. Mail survey pressure estimates exceeded that of the on-site by 31-42%. Fishermen from both surveys reported a similar release rate near 50%.

Table 5. Comparison of a mail harvest survey (Area 2) and on-site creel census of paddle fisherman on the Missouri River, 1993-95.

Year	ANGLER-DAYS		HARVEST	
	Mail	On-site	Mail	On-site
1993	3,857	2,253	530	422
1994	5,334	3,586	706	561
1995	5,301	3,647	806	712

Mean weight of female paddlefish has been monitored for many years and was thought to be a good indicator of over-harvest. An assumption was made that paddlefish weight was directly related to age. It was believed that if the average size of females decreased significantly, it would indicate an over-harvest of mature, egg bearing fish on which the future of the stock depended.

Information analyzed from tagged fish at large as long as 22 years does not support this assumption, however. Aging of harvested fish was not routinely conducted and no age/weight relationships over time had been investigated until recently. It is now generally agreed that the majority of paddlefish growth occurs in the juvenile or early adult stages. After reaching maturity, paddlefish growth is often insignificant. Mean annual growth was determined from fish tagged and recovered from the Fort Peck/Missouri River stock (Table 6). Thirteen males, at large since initial tagging an average of 11.3 years (range 4-20), provided the basis for the analysis. Mean annual weight change for male paddlefish was +0.5 pounds/year (range -0.9 to +1.7). Thirteen females, at large since initial tagging an average of 12.8 years (range 8-22), had a mean annual weight change of -0.2 pounds/year (range -3.0 to +2.3). Unless there is significant tagging related growth suppression, it would appear that the maximum size achieved by any particular paddlefish is most likely due to food availability and habitat conditions present in Fort Peck Reservoir during the fish's early growth period. This period would encompass about the first 10 years for males and the first 15 years for females.

Table 6. Weight differential over time for male and female paddlefish from the Fort Peck/Missouri River stock based on recaptures of tagged fish.

Tag No.	Date Tagged	Date Caught	No. Yrs. Growth	Initial Weight	Capture Weight	Difference (lbs.)	Mean Annual WT Change
<u>MALES</u>							
016	5/73	5/93	20	30.5	32.0	+01.5	+0.1
661	4/78	5/95	17	21.0	38.0	+17.0	+1.0
964	5/80	5/96	16	50.0	38.0	-12.0	-0.8
711	4/78	4/93	15	27.0	24.5	-02.5	-0.2
695	4/78	5/92	14	20.0	35.0	+15.0	+1.1
779	5/78	5/91	13	27.0	32.0	+05.0	+0.4
789	5/78	5/90	12	17.0	37.0	+20.0	+1.7
033	4/74	4/86	12	13.0	22.0	+09.0	+0.8
947	4/80	5/91	11	55.0	45.0	-10.0	-0.9
627	4/78	4/86	8	29.0	36.0	+07.0	-0.9
722	4/78	4/86	8	18.0	28.0	+10.0	+1.3
932	5/79	5/86	8	32.0	35.0	+03.0	+0.4
1161	4/86	5/90	5	45.0	46.0	+01.0	+0.2
1160	4/86	5/90	4	32.0	37.0	+05.0	+1.3
<u>FEMALES</u>							
508	5/73	6/94	22	50.0	59.0	+09.0	+0.4
461	4/74	4/94	21	88.0	89.0	+01.0	+0.1
756	5/78	5/94	17	52.0	57.0	+05.0	+0.3
242	4/78	4/93	15	85.0	79.0	-06.0	-0.4
181	5/77	5/91	14	50.5	68.5	+18.0	+1.3
639	4/78	5/91	13	84.0	80.0	-04.0	-0.3
048	4/74	5/86	12	64.0	62.0	-02.0	-0.2
793	6/78	5/88	10	79.0	80.0	+01.0	+0.1
950	5/80	5/89	9	62.0	35.0	-27.0	-3.0
760	5/78	5/87	9	40.0	61.0	+21.0	+2.3
654	4/78	5/86	8	102.0	103.0	+01.0	+0.1
649	4/78	5/86	8	92.0	95.0	+03.0	+0.4
245	5/78	6/86	8	67.0	60.0	-07.0	-0.9

As previously mentioned, harvest rates are not believed to be excessive at present. However, the low number of successful spawning runs (based on trigger flows) in recent years warrants additional scrutiny. A female paddlefish was observed in April of 1993 which was in the process of reabsorbing her eggs. This was most likely a fish that was ready to spawn in 1992, but due to low flows was unable to reach a suitable spawning site.

Annual spawning migrations were rated as to their probable success based solely on the fish's ability to ascend the river and reach spawning sites above FRB (Table 7). As mentioned, trigger flows of 14,000 cfs appear to be necessary to initiate spawning migrations upriver. Ratings of good, marginal and poor were assigned to each of the last twenty spawning seasons. Good years were determined to be those in which trigger flows occurred and the duration of those flows exceeded 30 days during the mid-May to mid-July spawning period. A marginal rating was assigned to those years in which trigger flows occurred, but the duration during the spawning season was less than 30 days. A poor rating was assigned to those years in which trigger flows were never reached and successful spawning was very unlikely or severely limited. From 1974 to 1983, 7 good years, 2 marginal years, and 1 poor year were experienced. In contrast, only 4 of the last 12 years were rated as good. Little or no reproduction was expected to have occurred in 7 of those years. It is possible that no year-classes were developed within the 6-year span from 1985 to 1990. The potential loss of recruitment will not be evident in the snagging fishery until 1995 and could persist until the year 2005. Aging of harvested fish during that time period may validate spawning success assumptions based on trigger flows.

Table 7. Paddlefish spawning success ratings for the years 1974-96 using trigger flow* (TF) incidence and duration as the sole criteria.

Year	Good	Marginal (# days>TF)	Poor
1974	X	-----	-
1975	x	-----	-
1976	X	-----	-
1977	-	-----	X
1978	X	-----	-
1979	-	X (20)	-
1980	X	-----	-
1981	X	-----	-
1982	X	-----	-
1983	-	X (29)	-
1984	X	-----	-
1985	-	-----	X
1986	-	X (19)	-
1987	-	-----	X
1988	-	-----	X
1989	-	X (05)	-
1990	-	X (03)	-
1991	X	-----	-
1992	-	-----	X
1993	X	-----	-
1994	-	X (06)	-
1995	X	-----	-
1996	X	-----	-

* Flows measured at the Virgelle Gauging Station

A system of angler tagging of harvested paddlefish was first implemented on the Missouri River in 1992. This system has been used successfully for a number of years on the Yellowstone River. A 2-fish per year limit was imposed statewide in 1992. In 1994, fishermen were allowed to harvest only one paddlefish from the Yellowstone and Lower Missouri River, while two per year could still be taken from the middle Missouri fishery. The only other significant regulation difference between the Yellowstone and Missouri River fisheries is that snaggers may immediately release a snagged fish if they so desire at the middle Missouri River fishery, but any fish snagged on the Yellowstone or lower Missouri River must be immediately tagged. No snagging mortality has been observed on the Missouri River. All mortality previously observed was connected with hygrading of held fish or from injuries sustained from contact with outboard propellers. Snaggers, in the past, would often "tie up" fish in the river then release them later if a larger fish was caught. The new tagging regulation eliminates this type of mortality. The "must keep" regulation on the Yellowstone River fishery is primarily designed to help reduce sociological conflicts associated with severe crowding. This situation does not occur on the Missouri River as the fishery is spread over many miles. Observations and discussions with veteran snaggers over many years indicate there is a significant voluntary effort to return large females to the river which would otherwise be harvested under a no-release restriction. There was some concern that restricting the harvest to one fish on the Yellowstone River might cause a mass relocation of fishermen to the Missouri River. Angler interviews since 1994 indicate this has not occurred.

Fresno Reservoir

Fresno Reservoir is a highly fluctuating reservoir of 5,757 surface-acres located on the Milk River 12 miles northwest of Havre. In most years, the demand for irrigation water results in water level fluctuations of 10-25 feet though maximum depth is only 48 feet. Systematic gill netting at predetermined stations was conducted in the 1960's and 1970's, but was discontinued in 1974. Traditional gill-net stations have been sampled since 1987 to determine changes in sport fish abundance and species composition. Samples were collected utilizing six experimental gill nets fished overnight on two consecutive days (12 net-days).

The lake whitefish catch rebounded from the previous years' low catch (Table 8). Whitefish continue to comprise a significant portion of the gill-net catch but are rarely caught by fishermen. Whitefish grow fast in the reservoir and thereby escape predation from all but the largest walleye and pike. Lake whitefish appear to reproduce successfully in years of good over-winter storage. The role of whitefish in this reservoir, either as a forage fish or competitor, is not understood at this time.

The paucity of adult yellow perch in the gill-net catch, since their introduction in 1969, can only be explained as the result of consistent heavy predation. Reproduction appears to be significant in most years, but few adults are ever captured by gill nets. The 1989 year-class was very strong and provided catches of large perch previously unheard of in Fresno Reservoir. The catch of large perch is probably short-lived. A decrease in both numbers of perch and average size was observed in both 1995 and 1996.

Northern pike are present in large numbers. Ice fishermen consistently take several fish every year weighing over 25 pounds. On August 20, 1994, local fishermen were employed to provide hook-and-line caught northern pike to the department for transplant purposes. Twenty-five two-man teams brought in 810 live northern pike in 3.5 hours. The fish averaged approximately 18 inches long. Handling mortality was estimated to be around 15%. A similar effort in October of 1995 yielded 140 pike in 4 hours. In August of 1996, 280 pike were collected in 6 hours of fishing.

The walleye gill-net catch was reduced from 1995 but still at acceptable levels. The 1995 year-class was also well represented. In recent years a positive correlation has been made between over-winter water levels and recruitment of YOY walleye to the population (Needham and Gilge, 1990). The strong showing of the 1995 year-class in connection with good over-winter storage in 1995-96 reinforces this correlation. Good recruitment occurred despite the fact that the YOY catch in 1995 was considered a very poor reproduction year.

Table 8. A summary of the catch in overnight sinking experimental gill net sets in Fresno Reservoir, 1965-96. Number of nets used varied from 4 to 12.

Species	Year	No.	Avg. No. Per Net Set	Avg. Length (in.)	Avg. Weight (lbs.)	Percent of Total
Lake Whitefish	1970	1	0.1	19.9	3.30	0.7
	1971	1	0.2	18.7	2.94	1.2
	1972	4	0.5	17.8	2.35	6.2
	1974	3	0.8	19.5	3.15	8.6
	1987	65	10.8	12.2	0.71	36.1
	1988	55	9.2	17.5	2.45	28.6
	1989	22	3.7	14.4	1.06	30.1
	1990	46	7.7	10.0	0.98	48.9
	1991	37	6.2	12.7	1.03	24.5
	1992	66	11.0	16.0	1.69	32.2
	1993	38	3.2	16.3	1.78	21.8
	1994	93	7.8	14.9	1.81	37.9
	1995	36	3.0	15.4	1.74	9.9
	1996	54	4.5	----	----	22.2
Yellow Perch	1969	7	0.9	5.4	0.07	12.3
	1970	20	2.5	6.9	0.16	13.8
	1971	6	1.5	7.6	0.23	7.4
	1972	2	0.3	8.7	0.40	3.1
	1974	2	0.5	5.7	0.09	5.7
	1987	43	7.2	6.2	0.13	23.9
	1988	24	4.0	8.7	0.32	12.5
	1989	0	----	----	----	0.0
	1990	0	----	----	----	0.0
	1991	16	2.7	8.2	0.40	10.6
	1992	3	0.5	7.8	0.29	1.5
	1993	12	1.0	9.2	0.43	0.7
	1994	25	2.1	11.2	0.56	5.6
	1995	19	1.6	8.3	0.40	5.2
	1996	6	0.5	7.1	0.19	2.5
Walleye	1965	14	0.9	12.4	0.80	17.9
	1966	14	2.3	11.6	0.62	34.2
	1967	11	1.6	12.9	0.88	24.4
	1968	29	3.6	12.3	0.64	56.9
	1969	24	3.0	12.9	0.92	42.9
	1970	95	11.9	14.4	1.16	65.5
	1971	28	7.0	13.6	1.08	34.6
	1972	34	4.3	16.1	1.44	52.4
	1974	22	5.5	15.9	1.35	62.9
	1987	37	6.2	16.7	1.99	20.6
	1988	67	11.2	15.5	1.97	34.9
	1989	32	5.3	14.6	1.14	43.8
	1990	28	4.7	15.7	1.74	29.9
	1991	88	14.7	13.3	0.88	58.3
	1992	102	17.0	15.0	1.40	49.8
	1993	108	9.0	13.3	1.05	62.1
	1994	180	15.0	13.4	1.08	40.4
	1995	219	18.3	14.4	1.29	60.3
	1996	123	10.3	13.7	1.11	50.6

Table 8. Continued.

Species	Year	No.	Avg. No. Per Net Set	Avg. Length (in.)	Avg. Weight (lbs.)	Percent of Total
Northern Pike	1965	23	1.6	18.2	1.23	29.5
	1966	6	1.0	20.1	1.68	14.6
	1967	7	1.0	20.6	2.50	15.6
	1968	9	1.1	17.8	1.66	17.6
	1969	9	1.1	19.7	1.88	16.1
	1970	12	1.5	16.3	1.33	8.3
	1971	30	7.5	17.0	1.12	37.0
	1972	5	0.6	17.3	0.93	7.7
	1974	1	0.3	20.6	1.84	2.9
	1987	35	5.8	19.1	1.74	19.4
	1988	46	7.7	20.6	2.85	24.0
	1989	19	3.2	21.6	2.74	26.0
	1990	20	3.3	19.2	2.09	21.2
	1991	10	1.7	19.3	2.28	6.6
	1992	34	5.7	21.1	2.49	16.5
	1993	16	1.3	16.1	1.06	15.4
	1994	72	6.0	18.2	1.41	16.1
	1995	89	7.4	19.7	2.04	24.6
	1996	60	5.0	20.5	2.01	24.7

Large walleye hatchery fingerlings (4-5 inches) were marked and released in Fresno Reservoir in September of 1990, 1992, and 1994. A total of 6,000, 10,500, and 9,300 were stocked respectively. The fish were marked by clipping the tip of the cartilage on either the left or right opercle. This was done to distinguish hatchery fish from wild fish and determine the contribution of hatchery fish to the existing year-class (Table 9).

Table 9. Numbers of hatchery walleye marked and subsequently recaptured in Fresno Reservoir, 1990, 1992, and 1994.

Year Class	Mark Type	Number Marked	Number In Recap Sample	Number Marked In Recap Sample	¹ Estimated Year-Class Strength
1990	R.OP	6,000	634	9	283,000
1992	L.OP	10,500	425	1	² N/A
1994	R.OP	9,300	181	4	125,500

¹Modified Petersen estimate assuming 25% initial handling mortality

²Insufficient number of recaptures

Accurate estimates of year-class strength are difficult to produce due to the low numbers of recaptures. Initial handling mortality is also unknown but is believed to be significant in light of observed gull predation following release and apparent post marking stress. However, even considering high initial mortality (25%), the number of recaptures was very low, indicating good natural reproduction and a limited contribution from hatchery fish.

Beach seining was conducted at 12 standard sampling sites around the reservoir in a continuing effort to evaluate reproductive success of sport fishes and assess forage fish abundance. The seining results showed below average numbers of YOY yellow perch (Table 10). High numbers of spottail shiners were observed despite exceptionally low numbers observed in 1995. Walleye YOY were present in high numbers. Northern pike reproduction appeared average. A relatively large number of YOY longnose suckers were sampled in 1996.

Montana State University - Northern embarked on a project in the summer of 1994 to gather baseline water quality data from Fresno Reservoir. This is the first data of this type ever gathered at Fresno. Additional data was collected in 1996. Some qualitative and quantitative zooplankton sampling was also conducted with Montana Fish, Wildlife, & Parks (MFWP) assistance.

Unusual flooding and runoff occurred in early April at Fresno Reservoir. Despite wide open gates, water flowed over the spillway at depths of .5 - 1 foot for several days. Large numbers of spottail shiners, walleye, whitefish and perch were drawn over or through the dam. Ice remained covering the reservoir throughout the overflow period. As many as 15 bald eagles were observed within a mile of the dam and spottail shiners were literally wind rowed up on the banks. Many walleye were observed in distress or dead upon the rocks below. The quantity of fish lost is not known but could have been significant

Table 10. A summary of forage fish and young-of-year game and sport fish taken with a 100- x 9-foot x 1/4-inch square mesh beach seine in Fresno Reservoir, 1965-96.

Date	Species and Number									
	Seine Hauls	Walleye	No. Pike	Yellow Perch	Emerald Shiner	Crappie sp.	Spottail Shiner	Sucker sp. ¹	Minnow sp. ²	Other ³
July 1965	7	0	8	0	0	2	0	0	0	0
August 1966	6	0	2	0	0	14	0	0	11	0
August 1967	10	24	5	0	15	19	0	0	276	0
August 1968	12	16	6	2,909	147	552	0	0	161	0
August 1969	12	4	6	1,140	385	67	0	2	380	0
August 1970	12	27	45	10,151	521	883	0	1	122	0
August 1972	12	102	22	1,005	205	379	0	0	72	0
August 1974	12	13	59	1,583	29	1,355	0	0	25	0
August 1975	11	10	32	4,154	155	59	0	0	0	0
August 1978	12	22	42	10,684	12	3	0	0	0	0
August 1979	12	29	45	8,516	340	127	0	1	0	1
August 1982	12	102	70	8,993	121	166	0	0	0	3
August 1983	12	23	0	2,254	448	9	0	1	7	0
August 1984	12	247	0	197	375	0	2	40	55	0
August 1985	12	64	0	379	684	3	2	0	9	0
August 1986	12	0	23	6,077	142	2	20	1	5	1
August 1987	12	80	113	6,233	1,979	7	3	0	3	0
August 1988	12	53	4	3,122	182	0	20	0	1	0
August 1989	12	56	32	24,706	22	0	16	2	0	0
August 1990	12	8	57	2,033	7	165	44	1	2	0
August 1991	12	8	36	3,425	0	42	53	0	0	0
August 1992	12	45	2	6,550	28	0	48	0	1	0
August 1993	12	24	9	5,595	12	2	162	0	0	0
August 1994	12	19	19	2,960	3	287	1,421	1	0	0
August 1995	12	5	2	1,080	0	2	129	0	1	0
August 1996	12	52	21	3,576	0	1	1,484	0	0	0

¹Consists of white and longnose sucker.

²Consists of silvery minnows, lake chubs, flathead chubs, and fathead minnows.

³Consists of burbot, smallmouth bass, and brook sticklebacks.

Population estimates

A mark/recapture estimate was made for walleye and northern pike in 1996. Walleye and northern pike were captured with trap nets and gill nets in April and early May. All fish were measured for total length, weighed and sexed. Walleye were tagged with two single-length coded wire tags in the opercle musculature. Pike were marked with a permanent fin clip (left pelvic). Scales were taken for ageing.

The highest catches came from the north and east side of the reservoir, primarily Kiehns Bay, Browns Bay and the upper reservoir area at the Milk River interface. Though fish were concentrated at the inflow, no fish were captured in the river itself at any time. Kremlin Bay and all net sites on the south/west shoreline exhibited poor catch rates throughout the spawning period. Kremlin Bay did appear to be frequented by adult spawning yellow perch, however. The recapture was conducted by examining fishermen catches in conjunction with a lake-wide creel census from May through September. All walleye were passed through a magnetic detector to determine the presence of tags. Northern pike were examined for fin clips. Scales were taken between the 1st and 15th of each month for aging purposes. Each fish in the recapture sample was assigned an age based on the subsample. Estimates were made using the Modified Petersen Method and are presented in Table 11. Estimates of age I and II walleye and age I pike could not be made due to insufficient numbers of marked and/or recaptured fish.

Table 11. Population estimates of walleye and northern pike, Fresno Reservoir, May, 1996.

Walleye		Northern Pike	
Age	N (80% CI)	Age	N (80% CI)
I	N/A	I	N/A
II	N/A	II	1,996 +/- 659
III	9317 +/- 1017	III	16,615 +/- 3810
IV	2073 +/- 390	IV	3,683 +/- 953
V	805 +/- 199	>V	569 +/- 242
>VI	2708 +/- 1163		
III and older	14,903 +/- 1352	II and older	22,853 +/- 3437

In regards to the coded wire tagging, it is noteworthy that a sample of seven fish were X-rayed and dissected at the end of the fishing season and all had retained both tags. No migration of the tags through bone or tissue was noted. Tag retention was assumed to be 100%.

Creel census

A creel census was conducted during the months of May through September, 1996. The ice-free fishing period generally includes the months of April and October, however fishing pressure is minimal during these months (< 50 angler days). It was estimated that during the creel period a total of 8,415 anglers expended 35,296 hours on the reservoir (Table 12). A total of 1,138 parties were interviewed over the summer which amounted to 30% of all parties that fished the reservoir. Boat fishermen accounted for 90% of those hours. Fishing pressure was twice that observed in 1990 which was the last time an on-site creel was conducted (Figure B).

Fresno Reservoir Fishing Pressure

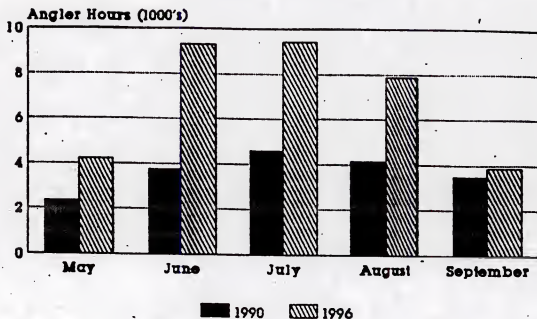


Figure B. Comparison of fishing pressure from on-site creel census conducted in 1990 and 1996, Fresno Reservoir.

Table 12. Fishing pressure and walleye catch rates for boat and shore fishermen on Fresno Reservoir, May-September, 1996.

Month	Boat Anglers			Shore Anglers			Boat/Shore Combined Fish/Hr.
	No.	Total Hrs.	Fish/Hr.	No.	Total Hrs.	Fish/Hr.	
May	829	3,585	.08	172	617	.06	.07
June	1,898	8,650	.81	263	657	.14	.76
July	1,901	8,542	.65	224	882	.08	.62
August	1,554	7,235	.30	246	637	.07	.28
September	910	3,342	.08	189	527	.15	.09
Totals	7,092	31,354	.44	1,094	3,320	.09	.41

Fishermen harvested approximately 7,505 walleye averaging 14.2 inches and 0.98 pounds (Table 13). Harvest was greatest in June. Boat fishermen accounted for 97% of all walleye taken. Combined boat and shore catch rates varied from .07 walleye/hour in May to .76 walleye/hour in June. Sixteen percent of the parties interviewed caught a limit(5) of walleye, however, only 8% of the parties kept a limit of fish (Table 14). Catch rates and fishing pressure were positively correlated. Age composition of the summer walleye harvest was determined by aging a cross section of creel fish taken in the first two weeks of the month and extrapolating numbers from the total estimated harvest each month (Table 15). Age III walleye comprised 76% of the catch followed by Age IV fish at 11%. Walleye younger than Age III accounted for 10% of the catch. Walleye Age V and older accounted for only 3% of the catch. Walleye in the 13.0-14.9 length range accounted for 55% of the harvest (Figure C). Age III walleye were exploited at 61% and Age IV walleye at 40% (Table 16). The overall exploitation rate on Age III and older walleye was 45%.

Table 13. Number and average size of walleye harvested by boat and shore anglers at Fresno Reservoir, May-September, 1996.

Month	Combined Harvest	Mean Length (in.)	Mean Weight (lbs.)	Total Harvest (lbs.)
May	239	14.1	1.01	241
June	2,985	14.0	0.92	2,746
July	2,688	14.2	0.95	2,554
August	1,387	14.4	1.07	1,484
September	206	15.2	1.32	272
Totals	7,505	14.2	0.98	7,297

Table 14. Incidence of walleye limit taking under a five fish, no size limit bag, Fresno Reservoir, April-September, 1996.

Month	No. Parties (Kept Limit)	%	No. Parties May Have (Kept Limit)	%	No. Parties (Kept None)	%	Interviews
April	0	0.0	0	0.0	0	----	29
May	0	0.0	0	0.0	0	----	176
June	34	12.6	85	31.5	51	18.9	270
July	34	12.7	72	27.0	38	14.2	267
August	19	7.7	25	10.1	6	2.4	247
September	0	0.0	4	2.7	4	2.7	149
Totals	87	7.6	186	16.3	99	8.7	1,138

Table 15. Number of walleye harvested by age each month, Fresno Reservoir, 1996.

Month	Age I	%	Age II	%	Age III	%	Age IV	%	Age V	%	Age >VI	%	No.
May	0	0.0	26	10.8	177	73.8	22	9.2	10	4.2	5	2.1	240
June	0	0.0	119	4.0	2,507	84.0	328	11.0	18	0.6	12	0.4	2,984
July	0	0.0	296	11.0	1,989	74.0	349	13.0	43	1.6	11	0.4	2,688
August	0	0.0	250	18.0	943	68.0	111	8.0	28	2.0	55	4.0	1,387
September	4	2.0	74	36.1	95	46.3	14	6.8	12	5.9	89	2.9	205
Totals	4		765		5,711		824		111		89		7,504

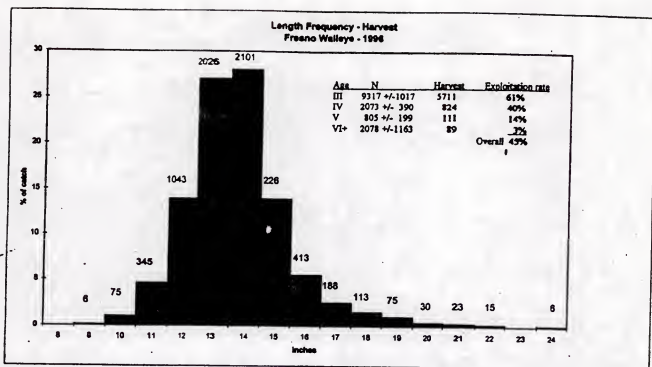


Figure C. Length frequency of walleye harvested from Fresno Reservoir and exploitation rates based on population estimates, 1996.

Table 16. Walleye exploitation rates based on population estimates made in Fresno Reservoir.

Age	N	Harvest	Exploitation Rate
III	9,317+/-1,017	5,711	61%
IV	2,073+/- 390	824	40%
V	805+/- 199	111	14%
VI+	2,078+/-1,163	89	3%
			Overall: 45%

The northern pike harvest was 5,037 fish, averaging 20.4 inches and 1.82 pounds (Table 17). However, 9,045 pike were caught and released. Boat fishermen were responsible for 90% of the harvest. Though the exploitation rate for Age II pike was 52%, the overall harvest rate was only 19% (Table 18).

Table 17. Number and size of northern pike kept and number of pike released during the May-September creel period at Fresno Reservoir, 1996.

Month	Mean Length (in.)	Mean Weight (lbs.)	Number Kept	Number Released
May	18.1	1.58	176	286
June	19.8	1.62	1,333	2,111
July	20.4	1.83	1,417	3,578
August	21.3	2.08	1,731	2,599
September	20.1	1.75	380	471
Totals	20.4	1.82	5,037	9,045

Table 18. Abundance and exploitation of the Fresno Reservoir northern pike population during entire creel and monthly, by age groupings, 1996.

Age	Exploitation During Entire Creel		
	Number	Harvest	Exp. Rate
II	1,986	1,026	52%
III	16,615	1,742	10%
IV	3,683	1,377	37%
VI+	569	254	45%
			Overall 19%

Month	Monthly Exploitation									
	Age I		Age II		Age III		Age IV		Age V	
May	0%	--	15%	27	66%	120	17%	31	0%	0
June	0%	--	3%	40	58%	773	35%	480	2%	27
July	3%	43	43%	609	40%	57	9%	128	3%	43
August	2%	35	11%	190	37%	640	42%	727	5%	87
September	15%	57	42%	160	40%	152	3%	11	0%	0
Totals	135		1,026		1,742		1,377		157	
									97	

Table 19. Number of fish stomachs analyzed from April through October, Fresno Reservoir, 1996.

Month	Walleye	No. Pike	Yellow Perch	Lake White-fish	Burbot	Long-nose Sucker	Crappie	Total
April	2	5	--	22	2	1	1	32
May	41	39	1	35	-	-	-	116
June	438	122	18	3	-	-	-	581
July	441	225	27	--	-	-	-	693
August	319	274	20	--	-	-	2	614
September	28	36	22	--	-	-	1	87
October	87	41	--	3	-	-	-	132
Totals	1,356	742	88	63	2	1	3	2,255

Yellow Perch catch per unit effort

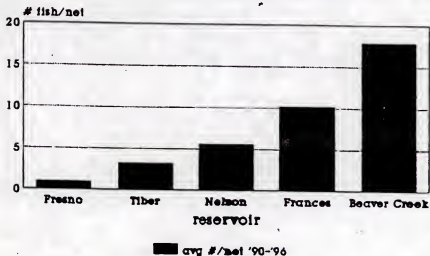


Figure D. Comparison of adult perch numbers at Fresno Reservoir with other perch/pike/walleye reservoirs in northcentral Montana.

The total estimated summer harvest of yellow perch was 752 fish. Adult yellow perch have never been abundant in the reservoir probably due to the numbers of predator fish and few alternate prey species. Compared to other north central Montana reservoirs with similar species assemblages, Fresno Reservoir perch numbers are perhaps critically low (Figure D). Only eight crappie were reported kept by interviewed fishermen. Although a large population of lake whitefish exists in the reservoir, only a few were observed in the creel.

Throughout the creel census period fish stomachs were examined and contents identified and enumerated. A total of 2,255 stomachs were examined, 1,356 from walleyes and 742 from northern pike (Table 19). No volumetric measurements were taken of stomach contents nor percent of items per stomach. Data was accumulated solely on the incidence of occurrence of any particular item in a stomach.

Though northern pike utilized fish at all times of the year, from May through September, crayfish was the predominant item in the stomachs examined (Figure E). Walleye competed for the same food-fish (spottail shiners and perch), however, burrowing mayflies *Hexagenia limbata* were the predominant food item through May, June and early July. Yellow perch and spottail shiners became the staple for walleye from July through October. Neither pike nor walleye utilized whitefish to any extent. No whitefish were found in any walleye stomachs examined and only 2 of 742 pike examined had ingested whitefish. Young walleye were preyed upon primarily in late summer by northern pike. Four percent (n=29) of pike examined had walleye in their guts. Yellow perch consumed large numbers of small crayfish throughout the year.

Nelson Reservoir

This reservoir is utilized by the Bureau of Reclamation for off-stream storage of irrigation water. At full storage capacity, it covers approximately 4,500 surface acres, but reservoir levels have fluctuated dramatically during the last 10 years. Spottail shiners were initially introduced to the reservoir in 1984 to supplement the existing walleye forage base. Three artificial walleye spawning shoals were constructed in 1993, and were immediately utilized by spawning walleye, as well as white suckers. Beach seining is conducted annually to determine reproductive success of sport and forage fishes. Beach seining was conducted in July at a number of sites on the reservoir, encompassing 870 feet of shoreline. The sport fish YOY catch consisted of 25 walleye, 13 northern pike, and 4,521 yellow perch (Table 20). The walleye YOY catch was above average. The yellow perch catch was near historical averages. Northern pike production was the highest recorded in 10 years.

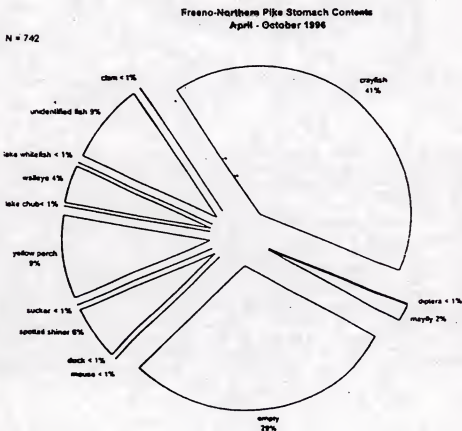
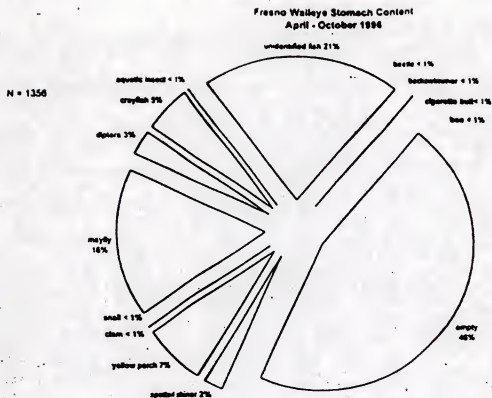


Figure E. Incidence of occurrence of food items in walleye and northern pike stomachs, April-October, Fresno Reservoir, 1996.

Table 20. A summary of walleye, yellow perch, and northern pike young-of-year captured by beach seining in Nelson Reservoir, 1974-96.

Year	Shoreline Seined (ft.)	Walleye		Yellow Perch		No. Pike	
		No.	No./1,000 (ft.)	No.	No./1,000 (ft.)	No.	No./1,000 (ft.)
1974	1,590	36	22.6	1,365	860	0	0.0
1975	1,845	112	60.5	3,008	1,630	0	0.0
1976	1,590	119	74.8	74	50	1	0.6
1977	1,740	1	0.6	2,939	1,690	0	0.0
1978	870	428	492.0	6,568	7,550	0	0.0
1979	1,530	23	15.0	1,832	1,200	2	1.3
1980	----- No seining conducted -----						
1981	615	31	50.6	8,859	14,400	1	1.6
1982	660	0	0.0	4,553	6,898	3	5.0
1983	1,420	4	2.8	138	100	18	12.7
1984	1,530	0	0.0	133	87	0	0.0
1985	510	3	6.0	2,272	4,455	16	31.4
1986*	700	0	0.0	3	4	7	10.0
1987*	495	5	10.1	1,987	4,014	0	0.0
1988*	520	0	0.0	783	1,506	0	0.0
1989*	910	10	11.0	736	809	4	4.4
1990	1,320	7	5.3	2,631	1,993	1	0.8
1991*	660	8	12.1	77	117	1	1.5
1992	635	21	33.0	140	220	6	9.0
1993*	520	3	5.8	8,287	15,937	1	1.9
1994*	830	6	7.2	1,802	2,171	10	12.0
1995*	760	36	47.4	232	305	0	0.0
1996*	870	25	28.7	4,521	5,197	13	14.9

*Years in which walleye fry or fingerlings were stocked.

Sporadic gill netting has been attempted at Nelson Reservoir in the past, but sampling was neither uniform nor consistent enough to develop useful trend data on game fish population size of composition. In the fall of 1991, five experimental gill-net stations were established and sampled for the first time. In 1993, five additional stations were added to increase sample size and reservoir coverage. Since 1993 all 10 stations have been utilized. The CPUE of walleye in 1996 has increased steadily since 1992 and was the highest catch rate observed since gill netting was instituted in 1991 (Table 21). Walleye year-class strength, as observed in the gill-net catch, appears to correlate more strongly with years of supplemental stocking than do beach seining results. Yellow perch CPUE declined steadily since 1991 but increased some in 1996. The northern pike catch increased to more normal levels in 1996. White sucker was the second most common fish captured. A large channel catfish was also netted for the first time in the reservoir, apparently emigrating as a stocked fingerling from the Milk River. Population trends of key sport-fish are exhibited in Figure F.

Nelson Reservoir population trends

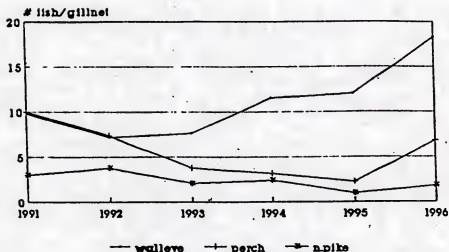


Figure F. Population trends of three key sportfish in Nelson Reservoir using fall gill-net CPUE.

Table 21. Relative catches of fishes from Nelson Reservoir with experimental sinking gill nets, fall 1991-96.

Year	No. Nets	Walleye		Yellow Perch		No. Pike		Lake Whitefish		White Sucker		Goldeye	
		n	CPUE	n	CPUE	n	CPUE	n	CPUE	n	CPUE	n	CPUE
1991	5	49	9.8	51	10.0	15	3.0	25	5.0	18	3.6	24	4.8
1992	5	36	7.2	37	7.4	19	3.8	29	5.8	26	5.2	2	0.4
1993	10	76	7.6	38	3.8	21	2.1	22	2.2	182	18.2	11	1.1
1994	10	115	11.5	32	3.2	24	2.4	60	6.0	82	8.2	3	0.3
1995	10	120	12.0	23	2.3	10	1.0	37	3.7	113	11.3	16	1.6
1996	10	183	18.3	68	6.8	18	1.8	32	3.2	135	13.5	22	2.2

In September of 1995, 9,500 four-inch walleye fingerlings from the Miles City Hatchery were opercle clipped and released to assist in estimating the numbers of fish in the 1995 year class and help determine the contribution of hatchery fish to the cohort. A total of 262 fish of that year-class have been captured to date by electrofishing and gill net. Only seven in the recapture sample were marked. Assuming 25% initial handling mortality, the number of YOY walleye as of September 1995 was estimated to be approximately 235,000 fish. The contribution of stocked walleye to the year-class amounted to 3%. Sampling will continue over several years to improve the size of the recapture sample.

Beaver Creek Reservoir

This 200-acre reservoir has a maximum depth of 90 feet and has provided a rainbow trout fishery of varying success since its initial filling in 1975. Its proximity to the city of Havre makes this reservoir a valuable local resource and it has been managed intensively in recent years with a variety of species. In the early 1980's, largemouth bass were introduced to help curb excessive sucker numbers and provide an additional sport-fish. Although bass reproduction has been documented, largemouth bass have not contributed significantly to the fishery. Soon after bass introductions were made, northern pike appeared from an illegal introduction. The northern pike population increased steadily and peaked in 1987. No northern pike natural reproduction was documented in 1985, 1988, 1989, or 1992. However, the northern pike YOY catch in 1993 was the highest recorded to date. Some of the initially introduced fish have exceeded 30 pounds in weight. Yellow perch were first found in the reservoir in 1986. Beach seining indicated good initial reproduction in 1987, but low YOY perch numbers were observed in 1989 and 1990 (Table 22). A large year-class of perch was produced in 1991, and was followed by another good production year in 1992. No reproduction was evident in 1993 and very little in 1996. An exceptional perch production year occurred in 1995. Yellow perch and spottail shiners provide much of the forage base as juvenile sucker numbers have declined steadily since 1986. However, due to the abundant alternate forage and a depressed northern pike population, white sucker YOY numbers increased in 1991 and 1992 and again in 1996. For the first time in almost a decade, no sucker YOY were captured by seining in 1993. Walleye YOY were captured by beach seining for the first time in 1996. This could be indicative of good survival of hatchery fish or successful natural reproduction.

Spottail shiners were introduced in 1988 to supplement the forage base. They have become well established as evidenced by the large numbers captured in 1995.

Table 22. A summary of sport fish YOY and forage fish taken by beach seining from Beaver Creek Reservoir, 1985-96.

Date	No. Hauls	WSU/LSU	YP	LK CH	FTHD MIN	Species ¹		EM SH	SP SH	NP	WE
						S/P MIN	ID				
9-04-85	5	2,535	0	7	0	0	11	0	0	0	-
6-16-86	4	3,110	0	1	0	0	2	0	0	9	-
8-19-87	6	969	2,281	2	1	2	72	1	0	10	-
8-23-88	6	54	4,401	0	0	0	4	0	1	0	-
8-21-89	6	45	29	2	0	0	0	3	602	0	-
8-21-90	6	1	42	0	0	0	2	1	93	2	0
8-13-91	6	348	8,615	0	0	2	0	2	835	12	0
8-10-92	6	492	1,938	0	0	0	4	0	156	0	0
8-18-93	6	0	0	0	0	0	11	0	455	27	0
8-08-94	6	49	707	0	0	0	0	0	181	11	0
8-19-95	6	6	7,210	0	0	0	0	0	1,438	13	0
8-12-96	6	261	5	0	0	0	7	0	247	5	7

WSU/LSU	- white/longnose sucker	S/P MIN	- silvery/plains minnow
YP	- yellow perch	ID	- Iowa darter
LK CH	- lake chub	EM SH	- emerald shiner
FTHD MIN	- fathead minnow	SP SH	- spottail shiner
WE	- walleye	NP	- northern pike

Walleye were stocked in 1987 due to local demand. The walleye management plan included three consecutive years of stocking followed by two non-stocking years to evaluate natural reproduction. Fish of each year-class were marked for future identification. Sufficient numbers of marked walleye were collected by 1992 to estimate all three walleye year-classes (Table 23). The estimates reflect cohort size at the end of their first growing season. It appears that fry plants have been quite successful in establishing a fishable population. Twenty walleye were captured in the fall gill netting. The walleye averaged 16.7 inches (range 11.5-27.5) and 2.16 pounds (range 0.52-6.10).

Table 23. Walleye stocking records and estimates of three walleye year-classes at the end of first growing season in Beaver Creek Reservoir.

Year Class	No. Fish Planted	Mark	Recapture Size (in.)	No. Sample Size	Re-captures	Estimate of Year Class ¹
1987	50,000 322	none right opercle	fry 6.0	55	12	1,391 ± 418
1988	100,000 193	none left ventral	fry 3.7	33	3	1,649 ± 888
1989	300,000 858	none right ventral	fry 4.5	103	23	3,722 ± 954

¹80% confidence interval.

Walleye stomach analysis indicates yellow perch and spottail shiners are heavily utilized. Growth of walleye to date is consistent with other local populations.

No walleye were stocked in 1990 or 1991. Beach seining and electrofishing were utilized to sample YOY walleye in the event limited natural reproduction occurred. No natural reproduction has been documented to date, but catches of YOY walleye in 1996 are encouraging. Efforts to confirm natural reproduction will continue in non-stocking years. Alternate-year plants of 200,000 fry began in 1992. Annual plants of 300,000 fry began in 1996.

Bailey Reservoir

This reservoir floods approximately 70 surface acres at full pool and has a maximum depth of 28 feet. It was constructed in the mid-1970's primarily for use as a fishing reservoir. Though privately owned, it has been under the management of the MFWP. Initial introductions of rainbow trout provided an excellent fishery. Northern pike were illegally introduced about 1980. No other fish were present in the reservoir and predation on trout soon became excessive. During a severe drought in 1984, the remaining trout winter-killed, but the northern pike survived. Larger trout were planted to reduce the level of predation, but without success. Chemical rehabilitation was considered, but at the request of the landowner the MFWP began to develop a cool/warm water fishery. Trout stocking was discontinued. Yellow perch and black crappie were introduced in 1987, followed by largemouth bass in 1988. Reproductive success of all department introduced fish has been good in most years.

Monitoring of adult sport fish by gill netting was initiated in 1990. Two overnight experimental sinking gill net sets were utilized in the sampling (Table 24). Yellow perch, black crappie and northern pike have grown exceptionally fast in this productive reservoir. Large catches of perch exceeding .50 pounds were common throughout the summer of 1991 and the following winter. A party of three fishermen remarked that they had taken home 93 pounds of perch fillets in a single weekend of ice fishing. The strong year-classes produced in 1991 and 1992 dominate the perch population at present and catches of large perch have declined significantly.

Table 24. Total catch from two experimental gill net sets at Bailey Reservoir, 1990-96.

Date	No.	Northern Pike		No.	Yellow Perch		No.	Black Crappie	
		X L (in.)	X WT (lbs.)		X L (in.)	X WT (lbs.)		X L (in.)	X WT (lbs.)
8-08-90	24	18.1	1.23	34	7.7	0.26	21	5.7	0.10
9-27-91	7	24.7	3.21	58	10.1	0.56	4	8.5	0.35
9-11-92	6	26.8	4.29	34	8.1	0.29	16	4.7	0.08
9-10-93	2	31.8	7.55	21	6.6	0.15	127	6.7	0.12
9-19-94	7	20.1	2.59	38	6.0	0.10	43	6.3	0.14
9-12-96	14	23.8	3.54	86	7.2	0.19	15	6.8	0.21

Though no largemouth bass were taken by gill netting, fishermen report regular catches of yearling bass and occasional fish up to three pounds. Black crappie are being taken in good numbers and the population appears to be quite healthy. Fishing pressure on northern pike is occasionally heavy. During the winter of 1989-90, as many as 32 spearing houses were on the reservoir on any given day. Dozens of large pike (>10 pounds) were reportedly harvested that same winter. The catch of adult pike since that winter has declined noticeably. The gill-net catch and poor fishermen success are suggestive of a low pike population at present. Good northern pike reproduction was last observed in 1990. A plant of 5,000 northern pike fingerlings was made in 1993 to supplement expected natural reproduction. Though high water levels in 1993 were conducive to spawning, no sign of naturally produced fish or hatchery fish was found by late summer. A transplant of 710 18-inch pike was made in August of 1994. These were fish that were "hook-and-lined" from nearby Fresno Reservoir. An additional 140 22-inch pike were transplanted from Fresno Reservoir in October of 1995. Some YOY pike were observed in 1996 indicating at least some natural production occurred. Though no netting was conducted in 1995, fishermen reported good catches of pike throughout the winter of 1995-96. Several walleye in excess of 8 pounds were also taken through the ice. These fish were apparently survivors from a single plant made in 1989.

Little Warm Reservoir

Little Warm Reservoir provided good fishing for northern pike and yellow perch until the dam washed out by flooding in 1986. The reservoir was subsequently drained for repair and refilled in 1988. The reservoir is privately owned and utilized for stock water and irrigation. The MFWP manages the fishery which is open to the public. The reservoir was stocked with 100,000 walleye fry in 1989, 1990, 1992, and 1994. Walleye fry plants were increased to 200,000 fry in 1996. Sixty-eight ripe adult crappie were introduced in 1989. Three experimental sinking gill nets were fished overnight in late May of 1995 to assess survival and growth of stocked fish. A total of 30 walleye were sampled representing all year classes. The walleye ranged from 7.1 to 21.1 inches. Weight of these fish ranged from .12 to 3.70 pounds.

No adult crappie were captured. Other species found in the reservoir are brook sticklebacks, Iowa darters, white suckers, golden shiners, yellow perch, black bullhead and fathead minnows. Most of these fish are common to the drainage and probably were introduced from upstream sanctuaries. A total of 24 adult white suckers were netted in 1993 compared with 9 in 1991 and 124 in 1994. Yellow perch are increasing in number and size.

Because of the large increase in white suckers, an additional piscivore was considered for introduction. The tiger muskie was chosen and 429 7-inch fingerlings were introduced in the fall of 1993. Two tiger muskies were netted in 1995 weighing 2.51 and 2.72 pounds. Reports of larger muskies were received.

No netting was conducted in 1996. Management plans include alternate year stocking of walleye fry and tiger muskie fingerlings to maintain fishable populations.

Fort Peck Dredge Cuts and Tailwater

Fish population sampling was continued in the Fort Peck dredge cuts and tailwater complex during June and September 1996. During both of these months, ten 125-x-6-foot multifilament experimental and four 100-x-8-foot,

one-half inch bar mesh monofilament gill nets were set overnight. Nets were fished for an average of 19 hours each. This netting effort was initiated in 1979 to obtain information on the overall fish population due to potential impacts associated with a Corps of Engineers proposal to construct additional hydropower facilities which included a regulation dam eight miles downstream from Fort Peck Dam. An additional objective is to evaluate the abundance of game fish in relation to cisco and rainbow smelt numbers.

The combined catch for walleye/sauger, the most popular sport fish in the area, was the highest in 1980 when 94 were netted. This was believed to be associated with an abundance of rainbow smelt in the area originating from a migration of smelt out of Lake Sakakawea, ND. The combined walleye/sauger catch in 1996 was 62 (Table 25), compared to 55 in 1994. The total number of rainbow smelt captured in 1996, was 63 (Table 26), which was similar to the harvest in 1995. The highest catch recorded since netting for rainbow smelt began in 1979, was in 1993, when 70 fish were netted.

The combined cisco catch in 1996 was 132, which was greater than the 1995 catch of 86. Cisco first appeared in the experimental net catch in 1985 and have become a significant forage source for piscivorous fish in the area. The presence of cisco correlates with introductions, beginning in 1984, into Fort Peck Reservoir. Dead and injured cisco continue to be observed in the Fort Peck tailpool periodically through the year.

A combined total of 143 shovelnose sturgeon were captured in 1996. Standard fork length and standard length measurements were taken and numbered spaghetti tags were inserted through the base of the dorsal fin on all fish. This was done to augment ongoing shovelnose and pallid sturgeon research in the lower Missouri and Yellowstone Rivers.

Table 25. Summary of 1996 June and September combined standard experimental gill netting with 383.6 hrs and 20 nets in the Fort Peck dredge pools.

Species ¹	Average Length (ins.)	Average Weight (lbs.)	Number	CPUE Per Hr.	CPUE Per Net
SNS	24.2 ¹	2.10	143	0.37	7.2
GE	12.6	0.67	113	0.29	5.7
LW	15.9	1.43	2	*	0.1
CI	9.6	0.33	132	0.34	6.6
CHS	---	---	0	---	---
RBT	---	---	0	---	---
RBS	6.1	0.01	4	0.01	0.2
NP	26.2	5.00	23	0.06	1.2
CP	17.0	1.81	6	0.02	0.3
RC	15.1	1.84	22	0.06	1.1
BS	23.5	3.40	1	*	0.1
SMB	26.1	9.61	1	*	0.1
BMB	---	---	0	---	---
SHR	17.8	2.31	2	*	0.1
LNS	18.1	2.75	2	*	0.1
WS	13.7	1.49	47	0.12	2.4
CC	15.7	1.30	69	0.18	3.5
BUR	---	---	0	---	---
YP	---	---	0	---	---
SG	15.8	1.32	18	0.05	0.9
WE	18.5	2.25	44	0.11	2.2
Total			629	1.64	31.5

1SNS-Shovelnose Sturgeon GE-Goldeye LW-Lake Whitefish CI-Cisco
 CHS-Chinook Salmon RBT-Rainbow Trout RBS-Rainbow Smelt
 NP-Northern Pike CP-Carp RC-River Carpsucker BS-Blue Sucker
 SMB-Smallmouth Buffalo BMB-Bigmouth Buffalo SHR-Shorthead Redhorse
 Sucker LNS-Longnose Sucker WS-White Sucker CC-Channel Catfish
 BUR-Burbot YP-Yellow Perch SG-Sauger WE-Walleye

¹Fork Length

*less than 0.01 fish/hour

Table 26. Summary of 1996 June and September combined standard smelt netting with 149.4 hours and 8 nets in the Fort Peck Dredge Cuts.

Species ¹	Average Length (ins.)	Average Weight (lbs.)	Number	CPUE Per Hr.	CPUE Per Net
SNS	-----	---	0	---	---
GE	12.8	0.68	3	0.02	0.4
CI	9.9	2.42	1	*	0.1
RBS	6.1	0.15	3	0.02	0.4
W/P	---	---	0	---	---
LNS	---	---	0	---	---
WS	10.7	0.83	4	0.03	0.5
YP	3.9	0.11	1	*	0.1
SG	---	---	0	---	---
CC	15.3	0.94	3	0.02	0.4
SPS	4.2	0.11	2	0.01	0.3
Total			17	0.11	2.1

¹SNS-Shovelnose Sturgeon GE-Goldeye CI-Cisco RBS-Rainbow Smelt
W/P-Western or Plains Silvery Minnow LNS-Longnose Sucker WS-White
Sucker YP-Yellow Perch SG-Sauger CC-Channel Cat SPS-Spottail
Shiner

²Fork Length

RECOMMENDATIONS

The 2-paddlefish annual limit, utilizing tags, should be continued on the Missouri River. The ability to immediately release a paddlefish should be retained. Annual collections of paddlefish jaws should be made to assist in determining the age structure of the Fort Peck Reservoir paddlefish stock. An annual mail/phone survey should be conducted periodically using names of anglers who purchased tags. Attempts should be made to tag 500+ paddlefish each year for the next three years. On-site creel census should be conducted every third year with a mail survey conducted in between. This information is invaluable in determining harvest rates and total harvest and pressure.

Standardized late summer seining to assess sport fish reproduction and forage fish abundance should be continued at Fresno Reservoir. Sampling of adult sport fishes should be continued utilizing fall gill netting to gather recruitment information relating to walleye year-class strength and winter reservoir water levels. Efforts should be made to increase perch production through habitat improvement and an additional forage fish should be considered for introduction. Fishing regulations tailored to protection of smaller walleye should be investigated.

Walleye reproduction is still considered to be below optimum at Nelson Reservoir, but appears to be improving. Alternate years of walleye fingerling stocking should be continued. Monitoring of reproductive success of sport and forage fish should continue. Newly constructed spawning shoals should be evaluated as to their usefulness to spawning walleye. A creel census similar to the one conducted in 1984 should be

considered after several good water years have been experienced. Marking of large fingerling stocked walleye may help assess the contribution of stocked fish to the fishery.

Beach seining and gill netting should be continued at Beaver Creek Reservoir to monitor growth and survival of stocked walleye. Consider annual walleye fry plants and alternate large fingerling plants.

Sampling of adult sport fish at Bailey Reservoir should continue to establish trend data and monitor growth and recruitment. Supplemental stocking of northern pike should continue until population is strengthened.

Continue alternate year stocking of walleye and tiger musky in Little Warm Reservoir. Evaluate annually by gill netting.

Netting surveys in the Fort Peck Dredge Cuts should continue to maintain data on the overall fish population.

LITERATURE CITED

- Berg, R. K. 1981. Fish populations of the wild and scenic Missouri River, Montana. Montana Department of Fish, Wildlife and Parks. Federal Aid to Fish and Wildlife, Restoration Project FW-3-R, Job Number 1-A, Helena.
- Brunsing, M. H. 1994. Survey and Inventory of Warmwater Lakes. Job. Prog. Rept. for Dingell-Johnson Project F-46-R-6, Job No. IV-c, Fort Peck Reservoir Study. pp.(mimeo).
- Gilge, Kent W. 1992. Survey and Inventory of Coldwater and Warmwater Ecosystems Job Progress Rept. for Dingell-Johnson Project F-46-R-5, Job V-d (mimeo).
- Needham, Robert G. 1985. Paddlefish Investigations. Job Prog. Rept. for Dingell-Johnson Project F-11-R-33, Job No. II-a. 6p. (mimeo)
- Needham, Robert G. and K. W. Gilge. 1990. Survey and Inventory of Coldwater and Warmwater Ecosystems. Job Prog. Rept. for Dingell-Johnson Project F-46-R-3, Job No. V-e. 24p (mimeo).

Waters referred to:

- 16-5140 Fort Peck Reservoir
- 16-2500 Missouri River Sec. 05
- 16-2520 Missouri River Sec. 06
- 15-5240 Fresno Reservoir
- 15-6480 Nelson Reservoir
- 15-4570 Beaver Creek Reservoir
- 15-4535 Bailey Reservoir
- 15-6105 Little Warm Reservoir

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